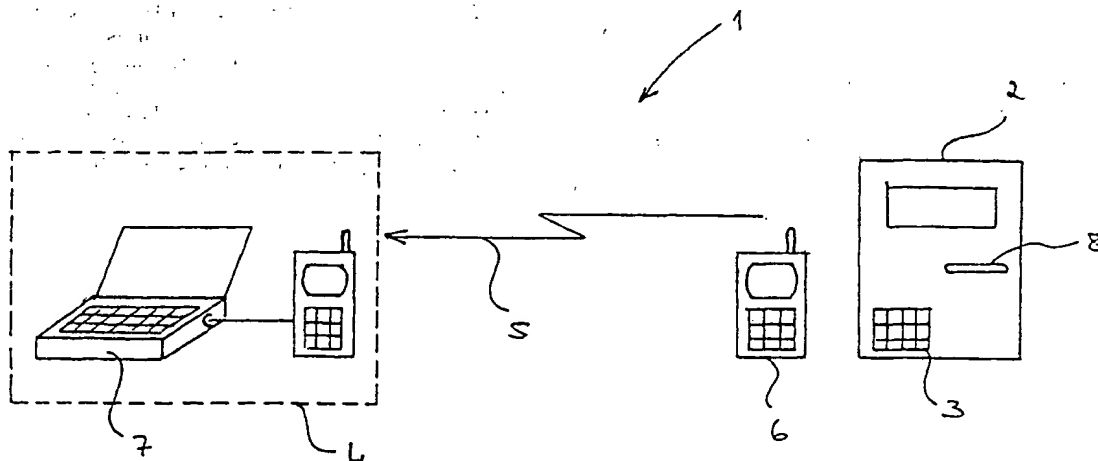




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : G07F 15/00, 7/02	A1	(11) International Publication Number: WO 00/58922 (43) International Publication Date: 5 October 2000 (05.10.00)
<p>(21) International Application Number: PCT/ZA00/00059</p> <p>(22) International Filing Date: 27 March 2000 (27.03.00)</p> <p>(30) Priority Data: 99/2347 26 March 1999 (26.03.99) ZA</p> <p>(71) Applicant (for all designated States except US): MERLIN GERIN S.A. (PROPRIETARY) LIMITED [ZA/ZA]; ** (ZA).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): BOS, Hermanus, Albertus [ZA/ZA]; 8 Loerie Park, Caeffron Avenue, Westville, 3630 Kwazulu Natal (ZA).</p> <p>(74) Agent: JOHN & KERNICK; Intellectual Property Law Office of Bowman Gilfillan Inc., P.O. Box 3511, 1685 Halfway House (ZA).</p>		<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>

(54) Title: UTILITY PURCHASES BY PREPAYMENT



(57) Abstract

A system for the prepayment of utility services comprises: a communication link, in particular a GSM link (5), between a consumer and a vendor of the utility services, the consumer having a prepayment meter (2) for dispensing the utility services; identification means for enabling the vendor to establish an identity of the prepayment meter along the communication link; a facility (7) for generating a prepayment token; and a transmitter (4) for transmitting the generated prepayment token to the consumer along the communication link, in particular by means of the SMS of the GMS link. The prepayment token is generated as a function of the prepayment meter identity and a selected quantity of utility services purchased by the consumer.

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UTILITY PURCHASES BY PREPAYMENT

FIELD OF THE INVENTION

5 This invention relates to the purchase of utility services by means of prepayment and, more particularly, to the transfer of credit information from a vendor of utility services to a prepayment meter regulating the dispensing of the utility services.

BACKGROUND TO THE INVENTION

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Payment for utility services is often achieved by means of prepayment, particularly in rural areas and third-world jurisdictions. Prepayment systems generally rely on the use of a token which is purchased by a consumer at a vending outlet. The token is used to effect a transfer of data from a vending
15 infrastructure to a consumer's prepayment meter.

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The token may be such that it is physically inserted into the prepayment meter to provide a pre-defined quantity of credit for the utility services, or it may be an alphanumeric string which, when entered into the prepayment meter, transfers a quantity of the utility services purchased by the consumer into the memory of the prepayment meter. It is known for such an alphanumeric string to be a 20 digit number, and for the number to be coded specifically for a particular prepayment meter, thus rendering it ineffective when used in conjunction with any other prepayment meter.

This type of prior art prepayment methodology is disadvantageous in that the consumer is required to visit a vending outlet to obtain a token in order to ensure that a valid and correct alphanumeric token is entered into the prepayment meter. It is also known for a consumer to require a magnetically encoded identity card bearing the identity of the prepayment meter in order to obtain the alphanumeric token from the vending outlet. The token must then be entered into the memory of the prepayment meter, usually by means of a keypad.

A further disadvantage of this type of prepayment method is that it is quite possible for a consumer to erroneously enter the alphanumeric token via the prepayment meter keypad into the meter memory.

OBJECT OF THE INVENTION

It is the object of this invention to provide a prepayment system and a method of operation thereof which will, at least partially, alleviate the abovementioned difficulties and disadvantages.

SUMMARY OF THE INVENTION

In accordance with this invention there is provided a method for the prepayment of utility services, comprising the steps of:

establishing a communication link between a consumer and a vendor of the utility services; the consumer having a prepayment meter for dispensing the utility services;

providing to the vendor along the communication link, data relating to the identity of the consumer's prepayment meter;

purchasing a selected quantity of utility services;

generating a prepayment token as a function of the prepayment meter identity and the purchased quantity of utility services; and

transmitting the generated prepayment token to the consumer along the communication link.

Further features of the invention provide for the method to include the further steps of:

establishing the communication link between the consumer and vendor of utility services by means of an access terminal; and

displaying the transmitted prepayment token on the access terminal, and for the

method to include the still further step of entering the displayed prepayment token into the prepayment meter to transfer the selected quantity of utility services purchased by the consumer into a memory of the prepayment meter.

5 Still further features of the invention provide for purchasing the selected quantity of the utility services by entering data relating to the purchase on a key pad associated with the access terminal.

10 Yet further features of the invention provide for the method to include the further steps of encrypting the generated prepayment token onto a data carrier in the access terminal; and transferring the data carrier from the access terminal to the consumer's prepayment meter

15 The invention extends to a system for the prepayment of utility services, comprising:

a communication link between a consumer and a vendor of the utility services, the consumer having a prepayment meter for dispensing the utility services;

20 identification means for enabling the vendor to establish an identity of the prepayment meter along the communication link;

a generation facility for generating a prepayment token as a function of the prepayment meter identity and a selected quantity of utility services purchased by the consumer; and

25 a transmitter for transmitting the generated prepayment token to the consumer along the communication link.

30 There is further provided for the communication link to be a Global System for Mobile telephony (GSM) telecommunication link, for the GSM telecommunication link to be accessible by means of an access terminal, preferably a GSM handset having a Subscriber Interface Module (SIM), for the identification means to establish the identity of the prepayment meter as a function of a unique telephone number on the SIM, and for the transmitter to transmit the generated prepayment token to the consumer by means of a Short Message Service (SMS) of the GSM telecommunication link.

35 There is still further provided for the transmitted prepayment token to be manually transferred to a prepayment meter regulating the dispensing of utility services to the consumer, alternatively for the transmitted prepayment token to be encrypted

onto a data carrier co-operable with the prepayment meter, and for the data carrier to be a smart card co-operable with the GSM handset.

There is yet further provided for the selected quantity of utility services purchased by the consumer to be entered by means of a keypad on the GSM handset

BRIEF DESCRIPTION OF THE DRAWINGS

One embodiment of the invention is described below, by way of example only, and with reference to the accompanying drawings in which:

FIG. 1 is a functional representation of a system for the prepayment of utility services.

DETAILED DESCRIPTION OF THE INVENTION

Referring to Figure 1, a system for the prepayment of utility services is indicated generally by reference numeral (1).

The system (1) includes a prepayment meter (2) for dispensing utility services to a consumer and a vending site (4) at which a vendor sells the utility services. A dial up GSM communication link (5) provides access to the vending site and is accessible by the consumer by means of an access terminal (6) in the form of a GSM handset.

The vending site (4) includes a generation facility (7) in the form of a processor arranged to generate a prepayment token (not shown) as a function of the prepayment meter identity and a selected quantity of utility services which the consumer wishes to purchase by means of prepayment.

In use, a consumer wishing to purchase a selected quantity of utility services from the vendor establishes communication with the vending site (4) by means of the GSM handset (6). The consumer's identity is established by means of the calling party's GSM telephone number which is then utilised in a lookup table to derive therefrom the identity of the consumer's prepayment meter. The consumer is then asked to indicate a selected quantity of utility services which he wishes to purchase and this information is utilised by the generation facility (7) to

generate an alphanumeric prepayment token as a function of the prepayment
meter identity and the selected quantity of utility services desired by the
consumer. The generated prepayment token is then transferred from the
vending site along the GSM telecommunication link by means of the SMS service
to the consumers GSM handset where it is displayed on a display of the GSM
handset.

The consumer then enters the prepayment token into the prepayment meter (2)
by means of the meter keypad (3), which is then configured to dispense the
purchased quantity of utility services to the consumer.

It will be appreciated by those skilled in the art that the system described above
eliminates the necessity of transcribing the generated prepayment token at the
vending site in order to supply the prepayment token to the consumer.

Numerous modifications are possible to this embodiment without departing from
the scope of the invention. In particular, the generation facility (7) may prompt
the user to enter the selected quantity of utility services which he desires by
means of a keypad (6) on his GSM handset. In this instance, all human
interaction between the consumer and the vending site eliminated, thereby
further reducing the possibility of generating an invalid prepayment token.

Still further, the step of manually transferring the generated prepayment token
from the consumer's GSM handset (6) to the prepayment meter (2) can be
eliminated altogether by utilising a data carrier to carry the prepayment token
received via the GSM telecommunication link (5) to the prepayment meter. It is
envisaged that in this embodiment the prepayment token generated and
transmitted to the consumers GSM handset (6) is encrypted onto a separate
smart card in the GSM handset (6). The smart card may then be removed from
the GSM handset (6) and introduced into a card reader (8) in the prepayment
meter (2).

The invention therefore provides a system and a method for purchasing utility services by means of prepayment which will reduce the possibility of transferring invalid prepayment tokens into a prepayment meter of a consumer.

According to the invention, a system is provided for purchasing utility services by means of prepayment which will reduce the possibility of transferring invalid prepayment tokens into a prepayment meter of a consumer.

The system comprises a central processing unit (CPU) and a database. The CPU is configured to receive a request from a consumer to purchase utility services by means of prepayment. The CPU is also configured to check the validity of the prepayment token. If the token is valid, the CPU is configured to transfer the token to the consumer's prepayment meter. If the token is invalid, the CPU is configured to reject the token.

The system also comprises a network interface. The network interface is configured to receive a request from a consumer to purchase utility services by means of prepayment. The network interface is also configured to check the validity of the prepayment token. If the token is valid, the network interface is configured to transfer the token to the consumer's prepayment meter. If the token is invalid, the network interface is configured to reject the token.

The system also comprises a display unit. The display unit is configured to display the status of the prepayment token. The display unit is also configured to display the amount of the prepayment. The display unit is also configured to display the date and time of the prepayment.

The system also comprises a user interface. The user interface is configured to receive a request from a consumer to purchase utility services by means of prepayment. The user interface is also configured to check the validity of the prepayment token. If the token is valid, the user interface is configured to transfer the token to the consumer's prepayment meter. If the token is invalid, the user interface is configured to reject the token.

The system also comprises a security unit. The security unit is configured to protect the prepayment token. The security unit is also configured to protect the amount of the prepayment. The security unit is also configured to protect the date and time of the prepayment.

CLAIMS

1. A method for the prepayment of utility services, comprising the steps of:
5 establishing a communication link between a consumer and a vendor of the utility services, the consumer having a prepayment meter for dispensing the utility services;
providing to the vendor along the communication link, data relating to the identity of the consumer's prepayment meter;
10 purchasing a selected quantity of utility services;
generating a prepayment token as a function of the prepayment meter identity and the purchased quantity of utility services; and
transmitting the generated prepayment token to the consumer along the communication link.
- 15 2. A method as claimed in claim 1 which includes further steps of:
establishing the communication link between the consumer and vendor of utility services by means of an access terminal; and
displaying the transmitted prepayment token on the access terminal.
- 20 3. A method as claimed in claim 2 which includes the still further step of
entering the displayed prepayment token into the prepayment meter to transfer the selected quantity of utility services purchased by the consumer into a memory of the prepayment meter.
- 25 4. A method as claimed in any one of claims 1 to 3 in which the selected quantity of the utility services is purchased by entering data relating to the purchase on a key pad associated with the access terminal.
- 30 5. A method as claimed in any one of claims 1 to 3 in which the further steps of encrypting the generated prepayment token onto a data carrier in the access terminal; and
transferring the data carrier from the access terminal to the consumer's prepayment meter

6. A system for the prepayment of utility services, comprising:
a communication link between a consumer and a vendor of the utility services, the consumer having a prepayment meter for dispensing the utility services;
- 5 Identification means for enabling the vendor to establish an identity of the prepayment meter along the communication link;
a generation facility for generating a prepayment token as a function of the prepayment meter identity and a selected quantity of utility services purchased by the consumer; and
- 10 a transmitter for transmitting the generated prepayment token to the consumer along the communication link.
7. A system as claimed in claim 6 in which the communication link is a Global System for Mobile telephony (GSM) telecommunication link.
- 15 8. A system as claimed in claim 7 in which the GSM telecommunication link is accessible by means of an access terminal.
- 9 A system as claimed in claim 8 in which the access terminals a GSM handset having a Subscriber Interface Module (SIM).
- 20 10. A system as claimed in claim 9 in which the identification means establishes the identity of the prepayment meter as a function of a unique telephone number on the SIM.
- 25 11. A system as claimed in claim 10 in which the transmitter transmits the generated prepayment token to the consumer by means of a Short Message Service (SMS) of the GSM telecommunication link.
- 30 12. A system as claimed in claim 11 in which the transmitted prepayment token is manually transferred to a prepayment meter regulating the dispensing of utility services to the consumer.
13. A system as claimed in claim 11 in which the transmitted prepayment token is encrypted onto a data carrier co-operable with the prepayment meter.

14. A system as claimed in claim 13 in which the data carrier is a smart card co-operable with the GSM handset.

5 15. A system as claimed in claim 14 in which the selected quantity of utility services purchased by the consumer is entered by means of a keypad on the GSM handset.

10 16. A method for prepayment of utility services, substantially as herein described with reference to the accompanying drawings.

17. A system for the prepayment of utility services, substantially as herein described with reference to and as illustrated in the accompanying drawings.

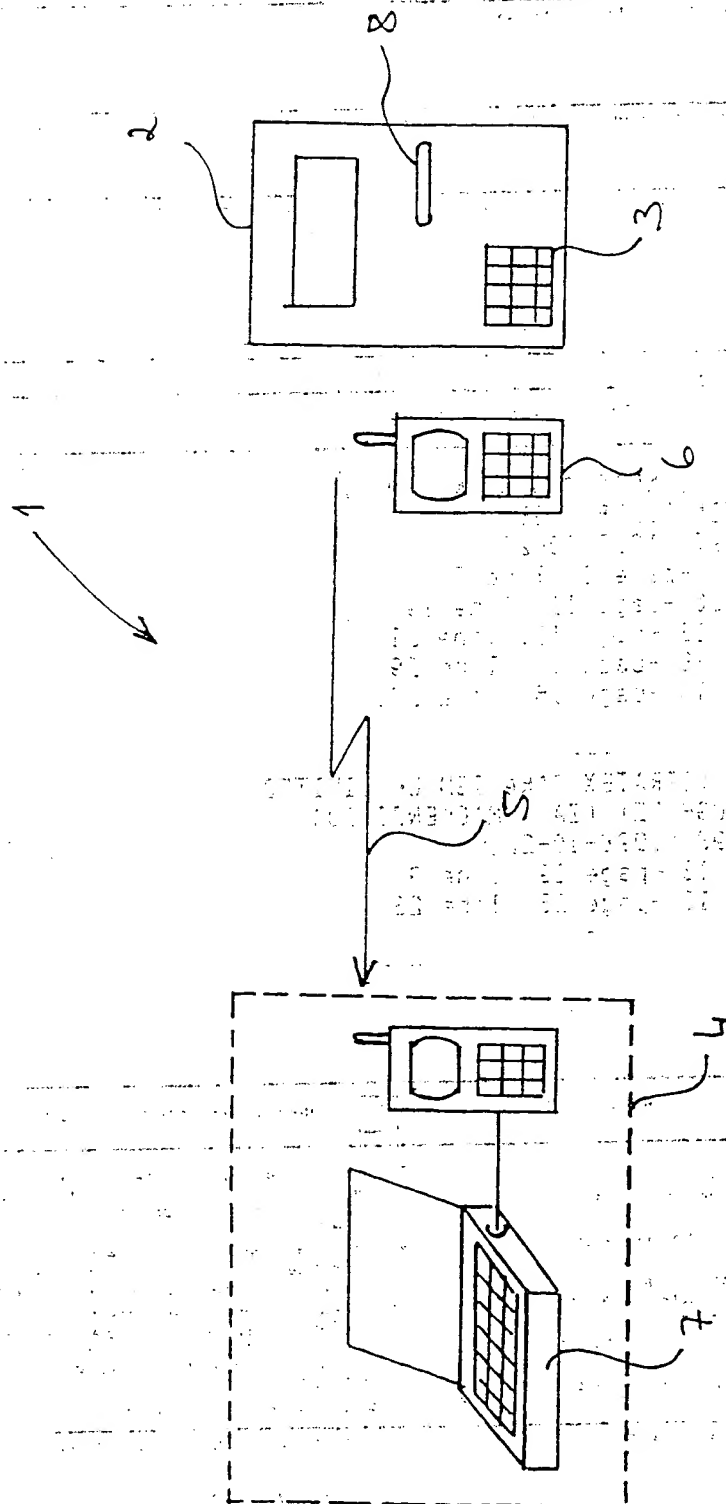


FIGURE 1

INTERNATIONAL SEARCH REPORT

International Application No. PCT/ZA 00/00059

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G07F15/00 G07F7/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 39430 A (LANDIS & GYR UK LTD ; POLLOCK MARTIN ROBERT (GB)) 23 October 1997 (1997-10-23) page 1, line 3 -page 1, line 7 page 8, line 30 -page 11, line 19 page 12, line 13 -page 12, line 21 page 12, line 35 -page 13, line 29 page 16, line 18 -page 16, line 27; figures 1-4	1, 4, 6
Y		2, 3, 5, 7-15
Y	WO 98 47112 A (STRATEX PARADIGM UK LIMITED ; MILLER IAN HUGH REX (ZA); MACKENZI DO) 22 October 1998 (1998-10-22) page 13, line 13 -page 19, line 9 page 25, line 10 -page 25, line 23	2, 3, 7-12, 15

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

10 July 2000

Date of mailing of the international search report

-18/07/2000

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 97 31306 A (NOKIA MOBILE PHONES LTD ;KURKI TEEMU (FI); SORMUNEN TONI (FI)) 28 August 1997 (1997-08-28) page 4, line 18 -page 5, line 8 page 5, line 33 -page 7, line 23 page 9, line 26 -page 10, line 2; figure 2	2,3,5, 7-11,13, 14
A	ANDERSON R J ET AL: "CRYPTOGRAPHIC CREDIT CONTROL IN-PRE-PAYMENT-METERING SYSTEMS" PROCEEDINGS OF THE SYMPOSIUM ON SECURITY AND PRIVACY,US,LOS ALAMITOS, IEEE COMP. SOC. PRESS, vol. SYMP. 16, 1995, pages 15-23, XP000547688 ISBN: 0-7803-2540-0 the whole document	1-15

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/ZA 00/00059

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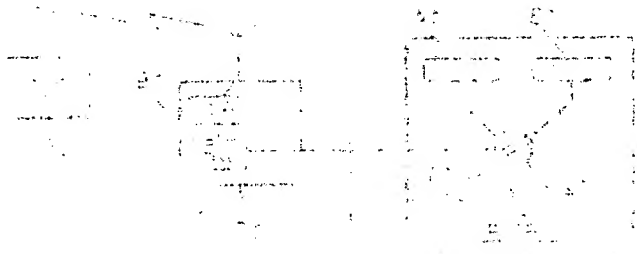
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